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| EXAMINER | |
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| PERROMAT, CARLOS | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/597,976 | REDERT ET AL. | |
| | Examiner | Art Unit | |
| | Carlos Perromat | 2628 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *24 January 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,2,4,5 and 7-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,5 and 7-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments filed 12/27/2011 have been fully considered but they are not persuasive.

The Applicant presents arguments at page 12 against Wilinski because allegedly Wilinski appears (emphasis) to teach against extracting depth information, justifying the position with a section in Wilinski in which Wilinski comments on the disadvantage of extracting depth information from video material in real time. First, the teaching in Wilinski pertains to real time depth information extraction, and cannot be applied to non-real time depth extraction. Second, Wilinski is explicitly aimed at generating a depth map, as can be seen in the title, abstract and claim 1. Third, Wilinski follows the cited statement by stating that the purpose in Wilinski is precisely to solve the cited problem. Finally, it is remarkable that the Applicant comments on what Wilinski appears to teach, since Wilinski has the same assignee and one inventor in common with the instant application. The Applicant follows the argument by arguing that Wilinski does not teach certain claim limitations which the Examiner explicitly indicated as absent in Wilinski, which is moot. With respect to Zheng, the Applicant presents arguments related to how the calculations in Zheng are different from those used by the Applicant with respect to the cost value calculation and path. Zheng is not cited as teaching these limitations, but rather as showing measuring depth across boundaries. At any rate the argument appears directed to how Zheng does or does not meet limitations that are found as obvious not merely in view of Zheng, but in view of the plurality of references cited, and

the Examiner considers that attacking Zheng as if Zheng was called upon for individually teaching the limitations is misguided. The Applicant appears to implicitly recognize this point at the end of page 15. The Examiner requests that the Applicant limits individual reference arguments to showing that the individual reference does not teach that which the Examiner explicitly attributes to it, and for limitations that the Examiner considers obvious over the plurality of references, to analyze what said plurality of references would or would not have made obvious. That Zheng or any other reference is cited in connection to a limitation does not mean, as the Applicant seems to contend, that the Examiner considers the limitation taught by that reference alone, and constitutes a piecemeal approach to argumentation by the Applicant. At page 17, the Applicant continues that approach with AAPA, alleging that it does not teach limitations that are allegedly missing from Zheng and Wilinski. Again the argument is inappropriate, for the reasons explained above. At page 18, the Applicant merely states that the combination of Wilinski, Zheng, AAPA and Wu does not teach a number of limitations in the claims, with no further argument. Copying the Examiners argument, showing disagreement and then copying the claims with several portions underlined, of which some have been added within the instant amendment, without explaining why the combination does not teach the limitations is inappropriate, and merely shows the Applicant's disagreements with the Examiner's positions, which is duly noted, but not convincing. No further arguments are provided.

The limitations added by amendment by the Applicant are further considered obvious in light of the plurality of references cited, as described below. It is the

Examiner's position that in a system that uses depth discontinuities between segmented objects in order to obtain relative depth variation, and that integrates said variations along a path, the pairs of pixels that supply that variation along the path, the edge pixels are distinct and separate, and further, that the path is one of a plurality of connected pixels, since it is the difference between the pixels along the path that is examined.

The Examiner considers the Applicant's arguments moot and/or fully not convincing, and the Examiner maintains the rejection for all claims as they were presented before final rejection.

### ***Claim Rejections - 35 USC § 101***

2. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 1, 2, 4, 5, 7-14 and 17 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 1 is directed to a method for computing depth values from luminance values from an abstract representation of an image. The claim is not tied to any particular apparatus and produces only an abstract result, that is, an abstract representation of depth based on numerical calculations. The method is therefore directed to an abstract idea, accomplishable without the aid of any machine, and therefore non-statutory.

Claims 2, 4, 5 and 7-14 are rejected on the same grounds as their parent claim 1, since they do not add limitations to the claim that would tie the claim to any specific

machine, or producing results that require physical acts on physical input or producing a physical change.

Claim 17 is directed to a computer-readable medium comprising instructions. The Applicant does not provide a limiting definition within the disclosure that would preclude the computer-readable medium from being correctly interpreted as directed to transmission media. Indeed, the specification, at page 12, lines 17-23 provides for instructions being provided to a processing system via a network, and therefore the computer-readable medium is, in light of the specification, directed to transmission signals, which constitute non-statutory subject matter. The Examiner suggests that the claim be directed to a non-transitory computer-readable medium, language that explicitly excludes transmission media from the embodiments claimed and for which the Applicant has support within the disclosure.

## ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 2, 4, 6-13 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilinski et al. (WIPO Publication No. 02/095680; "Wilinski" hereinafter) in view of Zheng et al. (Q. Zheng, R. Chellappa; Estimation of Illuminant Direction, Albedo, and Shape from Shading; IEEE Transactions of Pattern Analysis and Machine Intelligence, Vol. 13, July 1991; "Zheng" hereinafter), Redert et al. (WIPO

Publication No. 2004/066212; “AAPA” hereinafter) and Wu et al. (Z. Wu, L. Li; A Line-Integration Based Method for Depth Recovery from Surface Normals; IEEE, November 1988; “Wu”, hereinafter).

Examiner Note: AAPA shares an assignee and an inventor with the instant application. The examiner cites portions in AAPA that describe the state of the art prior or at the time of the filing of AAPA. The Examiner considers these statements as Applicant admitted prior art, particularly since the filing date of AAPA antedates the instant application.

Regarding claims 1, 15, 16 and 17, Wilinski teaches a method for generating from a single view input image, a depth map comprising depth values representing distances to a viewer, for respective pixels of the image (see p. 1, lines 10-18 for generating a depth map, see p. 2, lines 30-32 for a single image; see p. 8 for determining depth of pixels in the image by known methods) and assigning a depth value in a first group of depth values corresponding to the pixel (so that pixels belonging to the same image segment are assigned the same group of pixel values, see p. 6, lines 1 and 2 for seed values composing a pixel; see p. 8, lines 31-34 and p. 9, lines 1 and 2 for storing the depth values of the seed pixels; see p. 10, lines 26-28 for assigning to a pixel the depth value of the segment it belongs to). See p. 10, lines 21-30 for a system and units for performing the method, including an input of the digital image, and for preferably using a processor provided with a computer program to execute the method.

Wilinski does not explicitly teach computing cost values that comprise respective measures of a number of and extent of transitions in luminance and/or color

components for pixels of the image on a path related to a spatial disposition of objects in the image, wherein said computing includes computing a cost value for a first one of the pixels of the image by accumulating differences between luminance and/or color values of pairs of neighboring connected pixels at transitions which are disposed on a path from the first one of the pixels to a second one of the pixels wherein the second one of the pixels belongs to a predetermined subset of the pixels of the image. Wilinski does teach detecting transitions between objects in the image by contours (see p. 7, lines 29 and 30 for segmentation based on luminosity; see p. 5, lines 12-18 for using a method for detecting edges by intensity changes); and as mentioned before assigning depth to pixels in those edges, and through them to pixels in their segment. Zheng however teaches a method to obtain shape from shading using contours (see abstract; see p. 684, 1st col., 2nd par.), where the value of the intensity difference across an edge is determined and if it is above a threshold, detects a relative depth variation between the segments (see p. 684, 2nd col., 3rd and 4th pars.). Because Wilinski teaches performing segmentation of an image and depth determination of the pixels at the contours generated, and Zheng teaches determining the depth of edges in the image by examining intensity differences across edges, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the image segmentation and depth determination taught in Wilinski with the depth determination across edges taught by Zheng. This combination is implicitly suggested by Wilinski, which discloses segmentation and depth determination of edge pixels by known methods, and expressly

by Zheng, which discloses that the method can be improved by performing segmentation first; see the last three lines of page, 684, 2nd col., 3rd par.

Neither Wilinski nor Zheng teach that the measurements for depth are taken along a path which results in a cost function for each pixel which is being examined for depth, where the cost value comprises respective measures of a number and extent of transitions in luminance and/or color and/or color components for pixels of the image on a path related to the spatial disposition of objects of the image, wherein said computing includes computing a cost value for a first one of the pixels of the image by accumulating differences between luminance and/or color and/or color component values of pairs of neighboring connected pixels at transitions which are disposed on a path from the first one of the pixels to a second one of the pixels, wherein the second one of the pixels belongs to a predetermined subset of the pixels of the image, and assigning a depth value corresponding to the first one of the pixels on basis of the calculated cost value. AAPA however teaches that is known in the art to provide algorithms that result in relative depth orderings, and further, to supply depth values as a first derivative of the depth value. The examiner, therefore, considers obvious that, since the depth determination disclosed in Zheng is a relative depth between the two segments delimitated by the contour, that is, the change in depth across two segments, one of ordinary skill in the art would have understood that Zheng provides a qualitative depth value that comprises the first order derivative of the depth as taught by AAPA. One of ordinary skill in the art at the time of the invention would therefore find it obvious to obtain global depth information for the pixels in the image provided with segment and

relative depth information as taught by Wilinski and Zheng through the integration of the first order derivative of depth provided. In order to do this, the Examiner considers that it would have been obvious to one of ordinary skill in the art at the time of the invention to examine the different transitions along a path from the pixel to one of the edges of the image and to sum these differences which translate in depth differences as taught by Zheng. Reconstructing shape information from shading through the use of paths is well known in the art, as shown, for example in Wu (see abstract). Wu further teaches that why "we take multiple paths in equation 2.6 is based on that the error in depth estimation can be reduced by averaging. For the sake of simplicity, we usually choose two paths)" (see par. immediately below equation 2.7). The Examiner further points to equation 2.6 and 2.1 for integrating the estimated depth variations with respect to the spatial change; and formula 2.8 an immediately surrounding text for calculating the depth at a pixel in the discrete domain using the sampling spatial intervals as well as the change in depth regarding space, as well as the summation term that takes into account the number of pixel transitions between values. The Examiner further notices that there is nothing particularly novel in the use of the formula 2.8, which is merely a known expansion of formula 2.6. The Examiner also further notes that the change in depth between the pixels along the path is obtained independently from the method disclosed in Wu, by a shape from shading algorithm, see section III., first par., and further, that the change in depth over space disclosed in Wu, since depth is obtained from shape from shading indeed constitutes a change in luminance over space, as taught by Zheng. See also p. 3, lines 10-16 in the Applicant's specification for the equivalence of accumulation

and integration. Using a line integral such as that taught in Wu would have been obvious to one of ordinary skill in the art in view of Zheng, Wilinski and AAPA, since as it is well-known in the art, the integral is the reverse of the derivative, and therefore, the line integral across boundaries that provide a slope of depth naturally provides the total depth difference between the beginning of the line and the end, again as is well-known in the art.

Because the Applicant has not challenged the Examiner's statements regarding using path to retrieve depth information, integral as the reverse of the derivative and line integral as an integral providing the total value along a path of the derivative values as well-known in the art, the statements are considered Applicant's admitted prior art. See MPEP 2144.03.

Since Wilinski explicitly teaches both segmenting an image and estimating the depth of the pixels by known methods, as discussed above; Zheng explicitly teaches shape from shading to detect relative depth between segments, and explicitly suggests previously performing image segmentation, as also discussed above, and finally Wu teaches using relative depths obtained from shape from shading in order to assign global depth to pixels in an image, and since Zheng explicitly suggests using segmentation and relative depths between segments, the Examiner considers that it would have been obvious to one of ordinary skill in the art at the time of the invention to use a shape from shading method such as that taught in Zheng as the depth generating method to be used with Wilinski. Further, because Wu teaches a method of obtaining absolute depth from relative depth information obtained from shape from shading, the

Examiner considers that it would have been obvious to one of ordinary skill in the art at the time of the invention interested in obtaining the absolute depth of all the segments obtained by the combination of Wilinski and Zheng to use the method disclosed by Wu, using the relative depth provided by the combination of Wilinski and Zheng. Such a combination would obtain the absolute depth of the objects in the image from the path integrals disclosed by Wu applied to the edge pixels at the transitions between objects, as discussed by Wilinski and Zheng.

Finally, because Wilinski and Zheng teach segmenting an image into objects for the purposes of depth calculations, Wu teaches setting a path from each pixel calculated to a reference position (see p. 593, Implementation subsection, 3rd par.), the Examiner considers that it would have been obvious to one of ordinary skill in the art at the time of the invention that the method resulting from the combination of Wilinski, Zheng, AAPA and Wu is a method that obtains depth values for each pixel by tracing paths from the pixel to a reference position and integrating the relative differences along the path which AAPA and Wu consider derivatives, the resulting method integrates values encountered along the path which are distinct, since they are found along the path and correspond to the edges of objects, whether such values are found explicitly through prior segmentation or dynamically, by examining the values encountered throughout the path and using only those that have a difference large enough to be considered transitions between different objects. It is further understood that a line integral such as that employed in the combination from the calculated pixel to a

reference pixel is an integral performed on a path defined as connected pixels from said pixel to said reference position.

Regarding claim 2, Wilinski, Zheng, AAPA and Wu do not explicitly teach that the predetermined subset comprises one selected from the group consisting of (i) pixels which are located at a border of the image, (ii) pixels of a part of the border, and (iii) a central pixel of the image". Wu however teaches setting the reference pixel at the center of the image, see p. 593, Implementation subsection, 3rd par.; where the reference point is used as the target to create paths and is given and assumed depth, see p. 592, par. below formula 2.6. The Examiner considers obvious that when the image is assumed to have the object in the foreground as the central object in the image, which is a reasonable assumption for most images, the pixels at the edges of the image will more likely be the background and the pixel at the center will more likely be the foreground. Under that assumption, creating a path from the pixel being measured to the edge of the image would give a good approximation of height with respect to the background, and creating the path to the center of the image would give a good approximation to the foreground. Therefore, it would have been obvious to one of ordinary skill in the art to use or combine such paths in order to obtain a global depth value for the pixel, when no previous knowledge of depth is available.

Regarding claim 4, Wilinski, Zheng, AAPA and Wu do not explicitly teach that a second one of the differences is equal to an absolute value of difference between respective values of neighboring pixels which are disposed on the path. Wilinski teaches that the difference is compared to a threshold; see p. 684, 2nd col., 3rd par., and

a depth value is only computed if the difference is above that threshold. Obviously, when applying a threshold to the difference in intensity value, the absolute value would be used, since the difference value could be either negative or positive.

Regarding claim 7, Wilinski, Zheng, AAPA and Wu do not explicitly teach that "the cost value for the first one of the pixels is computed by accumulating the differences between the values of the pixels which are disposed on the path", although the examiner considers this limitation obvious as discussed. Zheng further teaches that the pixel values are adjusted to meet a predetermined threshold, see discussion for claim 4 above.

Regarding claim 8, Wilinski, Zheng, AAPA and Wu do not teach that the cost value for the first one of pixels is computed by accumulating products of differences between the values of the pixels which are disposed on the path and respective weighting factors for the differences. The Examiner however considers that, since Wilinski teaches that the pixels belonging to a segment receive the values for that segment, as discussed above, and the image is segmented in order to distinguish contours delimiting surfaces of the objects, and as taught by Zheng, determining the values of the edge pixels for the edge pixels requires local information, which could diffuse the value of depth for the transition at the edge where the pixel belongs (see p. 684, 2nd col., 4th par.) one of ordinary skill in the art at the time of the invention would have found it obvious to accentuate the differences between adjoining uniform surfaces by weighting the differences so that the objects silhouettes would have been more clearly defined, for example by weighting more heavily those differences that are closer

to the pixel measured, thereby increasing the contrast of the resulting depth image and compensating for the possible sampling error incurred in the sampling of neighboring pixels for edge pixels.

Regarding claim 9, Wilinski, Zheng, AAPA and Wu would have rendered obvious to one of ordinary skill in the art at the time of the invention that a first one of the weighting factors which is related to a difference between a value of a particular pixel and a value of its neighboring pixel, is based on a distance between the particular pixel and the first one of the pixels (see discussion for claim 8, above).

Regarding claim 10, Wilinski, Zheng, AAPA and Wu would have rendered obvious to one of ordinary skill in the art at the time of the invention that a second one of the weighting factors which is related to a difference between a value of a particular pixel and a value of its neighboring pixel, is based on the location of the neighboring pixel related to the particular pixel (see discussion for claim 8, above).

Regarding claim 11, Wilinski, Zheng, AAPA and Wu implicitly teach computing a second cost value for the first one of the pixels of the image by accumulating differences between luminance and/or color and/or color component values of pixels which are disposed on a second path from the first one of the pixels to a third one of the pixels which belongs to the predetermined subset of the pixels of the image (see Wu, p. 592, 1$^{st}$ col., par. below formula 2.7 for using multiple paths for reducing errors in measurement, see rejection for claim 1).

Although Wu teaches using the average of the relative depths obtained along the path to resolve conflicting cost values for the same pixel, the Examiner considers

obvious that where two or more conflicting measurements for a unique value are found, there are a limited number of choices on how to solve said conflict. Therefore it would have been obvious for one of ordinary skill in the art to modify the method disclosed in Wu, with a choice of value when two or more conflicting values are found for the same measurement to resolve this conflict by either choosing the larger value, the lower value, the average value or some weighted combination of both as also taught by Wu in the cited section. Arriving at the conclusion that the minimum value is more likely to be correct would have come naturally to one of ordinary skill in the art at the time of the invention after normal testing of the method, if, for example, it was found that the most frequent error in measurement is to overestimate the value for a point.

Regarding claim 12, Wilinski, Zheng, AAPA and Wu also teach computing a second cost value for a third one of the pixels on basis of the cost value for the first one of the pixels (in Wilinski, see p. 10, lines 26-28 for assigning each pixel the pixel value of the segment it belongs to and discussion above for calculating the depth of the pixels in the contour in order to get that depth).

Regarding claim 13, Wilinski, Zheng, AAPA and Wu also teach “computing the second cost value by combining the cost value of the first one of the pixels with a difference between further values of further pixels which are disposed on a second path from the third one of the pixels to the first one of the pixels” (see discussion for claim 11, above, for how Wu teaches averaging the results obtained from two paths).

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wilinski et al. (WIPO Publication No. 02/095680; "Wilinski" hereinafter) in view of Zheng et al. (Q. Zheng, R. Chellappa; Estimation of Illuminant Direction, Albedo, and Shape from Shading; IEEE Transactions of Pattern Analysis and Machine Intelligence, Vol. 13, July 1991; "Zheng" hereinafter), Redert et al. (WIPO Publication No. 2004/066212; "AAPA" hereinafter) and Wu et al. (Z. Wu, L. Li; A Line-Integration Based Method for Depth Recovery from Surface Normals; IEEE, November 1988; "Wu", hereinafter) as applied to claim 1 above, and further in view of Cahill et al. (U.S. Patent Publication No. 2004/0062439, "Cahill" hereinafter).

Regarding claim 5, Wilinski, Zheng, AAPA and Wu also teach that "the values of pixels correspond to one of luminance (....)" (see discussion for claim 1, above). Wilinski, Zheng and Wu do not teach that the values of the pixels are measured in terms of color. Cahill however also teaches a method of generating a depth map where color is used in conjunction with luminance for segmentation (see par. [0002]).

Because Wilinski, Zheng, AAPA, Wu and Cahill teach methods of creating depth maps from a 2-D image, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the pixel evaluation of luminance in Wilinski, Zheng and Wu with the alternative evaluation of chrominance taught in Cahill because both techniques are interchangeable and combinable to give a more precise result, one applying to grey-level pictures, and the other to color pictures, and both are well-known in the art as taught by Cahill.

1. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wilinski et al. (WIPO Publication No. 02/095680; "Wilinski" hereinafter) in view of Zheng et al. (Q. Zheng, R. Chellappa; Estimation of Illuminant Direction, Albedo, and Shape from Shading; IEEE Transactions of Pattern Analysis and Machine Intelligence, Vol. 13, July 1991; "Zheng" hereinafter), Redert et al. (WIPO Publication No. 2004/066212; "AAPA" hereinafter) and Wu et al. (Z. Wu, L. Li; A Line-Integration Based Method for Depth Recovery from Surface Normals; IEEE, November 1988; "Wu", hereinafter) as applied to claim 12 above, and further in view of Nakatsuna et al. (U.S. Patent Publication No. 2002/0154116).

Regarding claim 14, Wilinski, Zheng, AAPA and Wu further teach that "cost values corresponding to respective pixels of the image are successively computed on basis of further cost values being computed for further pixels" (see discussion for claim 1, above). Wilinski, Zheng and Wu do not teach that a first scan direction of successive computations of cost values for a first row of pixels of the image is opposite to a second scan direction of successive computations of cost values for a second row of pixels of the image, although Wu teaches performing the computations on a row-by-row basis (see p. 593, subsection Implementation, first par.). Nakatsuna, however, teaches a method of interpolating depth values on a pixel-by-pixel basis (see par. [0119] and [0165]), in which the pixels are evaluated in a zigzag path, so that pixels may be positioned in a two-dimensional neighborhood (see par. [0179]).

Because Wilinski, Zheng, AAPA, Wu and Nakatsuna disclose evaluating depth for pixels on a row-by-row basis, it would have been obvious to one of ordinary skill in

the art at the time of the invention to combine the depth measurement method as disclosed in Wilinski, Zheng, Wu, with the zigzag inspection path disclosed in Nakatsuna. Such an approach would be representative of the well known principle of locality in program optimization, by which it is advantageous to perform tasks in such an order that the values that have just been calculated and are therefore readily available, are those needed to perform the next calculation.

Because the Applicant has not challenged the Examiner's statements regarding locality in programming as well-known in the art, the statements are considered Applicant's admitted prior art. See MPEP 2144.03.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carlos Perromat whose telephone number is (571) 270-7174. The examiner can normally be reached on M-TH 8:30 am- 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kee M. Tung can be reached on (571)272-7794. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kee M Tung/
Supervisory Patent Examiner, Art Unit 2628

/Carlos Perromat/
Examiner
Art Unit 2628

C.P.